REMARKS

In the Office Action mailed March 1, 2006, the Examiner noted that claims 1-24 and 27-35 were pending, and rejected claims 1, 14, 15, 17-19 and 32-35. Claims 2-13, 16, 20-24 and 27-31 have been withdrawn. Claims 25 and 26 have been canceled, no claims have been amended, new claim 36 has been added, and, thus, in view of the forgoing claims 1, 14, 15, 17-19 and 32-36 remain pending for reconsideration which is requested. No new matter has been added. The Examiner's rejections are traversed below.

On page 2 of the Office Action, the Examiner rejected claims 1, 14, 17, 32, 33 and 35 under 35 U.S.C. § 102 as anticipated by Winkelman. Page 4 of the Office Action rejects claim 18 under 35 U.S.C. § 103 over Winkelman and Kinjo. Page 4 of the Office Action also rejects claims 15, 19 and 34 under 35 U.S.C. § 103 over Winkelman and Katajamaki.

The invention of claim 1 is directed to dividing an image into sub-areas, computing a characteristic amount for each sub-area, computing a statistic amount for estimation of the tone color value level for the whole original image from the characteristic amounts of the sub-areas.

The Examiner cites Winkelman at col. 3, lines 12-13, col. 11, lines 15-23, col. 11, lines 25-38, and col. 12, line 45-col. 13, line 5 as teaching these "tone level" features. This is not the case. In particular, the Examiner characterizes the standard deviation (scatter) as being used as an estimation of tone level. Winkelman discusses dividing an image into sub-images, analyzing the sub-images, producing a histogram for each of the sub-images, and producing a histogram parameter for each of the sub-images, with a parameter, such as the standard deviation, **SDev**, being produced for each of the sub-images. As set particularly forth specifically in Winkelman:

> Evaluation of the **Sub-image** Histograms Step [C1]
> The identification of the **sub-images** critical to the image and not critical to the image takes place, for example, with the assistance of the statistical histogram parameter **SDev** "scatter" or, respectively, "standard deviation" and of the histogram parameter FlAnt "relative area proportion of the most frequent image values", referred to in short as histogram parameter FlAnt "rel.area proportion". However, other histogram parameters can also be utilized.
> The histogram parameter **SDev** "scatter" is a measure for the average mean deviation of the image values from the mean of the histogram distribution. **Sub-images** having a low scatter or standard deviation probably contain less structure and thus are not critical to the image. **Sub-images** having a high value of scatter or standard deviation probably contain a great deal of structure and thus are critical to the image.
> A later classification into image-critical and image-noncritical regions ensues via a definable thresholding of the histogram parameter **SDev** "scatter" with a

threshold value SwSDev. When the value of the histogram parameter **SDev** "scatter" of a **sub-image** is lower than the prescribed threshold SwSDev, then the **sub-image** is classified as being low in structure.

A conclusion regarding a great deal of structure in the **sub-image** cannot be unambiguously derived from a high value of the histogram parameter **SDev** "scatter". This is true, for example given images with large-area image regions of different luminance that are low in structure (for example, bimodal histogram distributions). The histogram parameter FIAnt "rel.area proportion" then is utilized for recognizing initialization in this type of image.

The histogram parameter FLAnt "rel.area proportion" serves as a measure of the "planarity" of the image original, i.e. for the proportion of low-structure image regions in the **sub-image**. The histogram parameter FLAnt "rel.area proportion" indicates the relative proportion of the most frequent image values with reference to the total number of image values in a **sub-image**. **Sub-images** having a high value of the histogram parameter FLAnt "rel.area proportion" probably contain little structure and thus are not considered critical to the image. **Sub-images** having a low value of the histogram parameter FLAnt "rel.area proportion" probably contain a great deal of structure and thus are critical to the image.

The later classification into image-critical and image-noncritical regions with the assistance of the histogram parameter FLAnt "rel.area proportion" likewise ensues via a definable thresholding step utilizing a threshold value SwFLAnt. When the histogram parameter FLAnt "rel.area proportion" of a **sub-image** is higher than the prescribed threshold SwFLAnt, then the **sub-image** is classified as low-structure.

For the later **sub-image** classification, the threshold SwSDev of the histogram parameter **SDev** "scatter" and the threshold SwFLAnt of the histogram parameter FLAnt "rel.area proportion" are first defined. The thresholds determine the division into the two parameter classes. Given image originals having much structure, i.e. when a great number of **sub-images** contains structure, a higher threshold can be selected higher. Given image originals having less structure, i.e. when a small number of **sub-images** contains structure, a lower threshold can be selected.

For evaluating the **sub-image** histograms, the histogram parameter **SDev** "scatter" and the histogram parameter FLAnt "rel.area proportion" are calculated for every **sub-image** according to calculating methods for statistical evaluation of histograms.

The histogram parameter **SDev** "scatter" is calculated in the following way:

A **sub-image** composed of a sequence of image values x.sub.1, . . . x.sub.N. N references the total plurality of image values in the value range of the image values x.sub.i : 1, . . . M. H(i) is the plurality of image values having the value i in a **sub-image**.

The plurality of image values N is first calculated: ##EQU9##

For the calculation of the histogram parameter **SDev** "scatter", the mean value of the frequency distribution is then first calculated, whereby the mean value of a frequency distribution is that image value around which the other image values of the distribution group. The mean value is generated by the following: ##EQU10##

Subsequently, the variance Var is defined: ##EQU11##

The histogram parameter **SDev** "scatter" derives therefrom as: ##EQU12##

The standard deviation or, respectively, variance is a measure for the average or

mean deviation of the image values from the mean of the distribution. When the standard deviation is low, then the image values lie close to the mean on average (narrow frequency distribution). When the standard deviation is high, then greater deviations of the image values from the mean will be more frequent (broad frequency distribution).

The histogram parameter FLAnt "rel.area proportion" is calculated in the following way:

For calculating the histogram parameter FLAnt "rel.area proportion", the histogram values H(i) are first sorted in the descending sequence of the frequency.fwdarw.H.sub.s (i). By prescribing the plurality n of histogram values H.sub.s (i) to be accumulated, the histogram parameter FLAnt is calculated as: ##EQU13##

The histogram parameter FLAnt indicates the relative proportion S of the most frequent image values with reference to the total number of image values and is a measure for the "planarity" or "flatness" of the original, i.e. for the proportion of low-structure image regions in the original.

After the calculation of the histogram parameter **SDev** "scatter" and FLAnt "rel.area proportion", the thresholds SwSDev and SwFLAnt are defined, as set forth below.

It has proven advantageous to define the threshold SwSDev and/or the threshold SwFLAnt depending on the original in order to obtain an adequate plurality of image-critical **sub-images** for calculating the luminance histograms.

The following process can be implemented for defining the threshold SwSDev for the histogram parameter **SDev** "scatter".

For image-dependent definition of the threshold SWSDev, the frequency distribution of the values of the histogram parameter **SDev** "scatter" of the individual **sub-images** is utilized.

For that purpose FIGS. 4A and 4B illustrate a frequency distribution of the histogram parameter **SDev** "scatter" for image originals having little structure (upper. FIG. 4A) and for image originals having much structure (lower. FIG. 4B). Differently defined thresholds S respectively separate the frequency distributions into two parts that can be interpreted as being separate frequency distributions. The "informational content" (entropy) is respectively calculated for separate frequency distributions, whereby the threshold S is shifted across the possible value range. The entropy function .PHI. (S) is defined as the sum of the entropies of the two individual, separate frequency distributions dependent on the threshold S shifted over the possible value range.

For that purpose, FIG. 5 illustrates a typical course of an entropy function b (S). For example, that value S at which the entropy function .PHI. (S) has a maximum value or at which the entropy function .PHI. (S) achieves a percentage of the maximum value of, for example, 90% is then selected as the threshold SwSDev for the histogram parameter **SDev** "scatter".

The following may be said regarding the definition of the threshold SwFLAnt for the histogram parameter FLAnt "rel.area proportion":

For example, a fixed value can be prescribed for the threshold SwFLAnt of the histogram parameter FLAnt "rel.area proportion". However, the plurality of the most frequent image values to be accumulated is identified depending on the image scope (minimum/maximum value of luminance) in the calculation of the histogram parameter FLAnt.

After the calculation of the histogram parameter **SDev** and FLAnt for all sub-areas, the histogram parameters **SDev** and FLAnt are recalled in and compared

to the corresponding thresholds SwSDev and SwFLAnt for the classification of image-critical (structure-rich) and image-uncritical (structure-poor) **sub-images**.
Sub-image Classification Step [C2]
The classification of the **sub-images** can proceed according to the following classification pattern:
______________________________________ Parameter Parameter "Scatter" "Rel. area proportion" **SDev** < Sw**SDev** **SDev** > Sw**SDev**
______________________________________ FLAnt > **Sub-image Sub-image** SwFLAnt Without Structure Without Structure FLAnt < **Sub-image Sub-image** SwFLAant Without Structure With Structure
____
Denoted in this classification pattern are:
SDev=histogram parameter "scatter"
FLAnt=histogram parameter "rel.area proportion"
SwSDev=threshold for histogram parameter "scatter"
SwFLAnt=threshold for histogram parameter "rel.area proportion".
A **sub-image** that only contains structure is thus classified as image-critical when the value of the histogram parameter **SDev** "scatter" is higher than the prescribed threshold SwSDev and the value of the histogram parameter FLAnt is lower than the prescribed threshold SwFLAnt.
The **sub-image** histograms of those **sub-images** that were classified as structure-rich according to the above classification pattern are utilized for the calculation of the aggregate histogram according to Method Step [D], and this is set forth below.
Method Step [D]
In a fourth method step [D], an aggregate histogram that corresponds to the frequency distribution of the image values or, respectively, of the luminance component in the image-critical **sub-images** is calculated from the **sub-image** histograms of the subimages classified as image-critical. For that purpose, the functionally corresponding frequency values for every luminance stage L* are added together in the individual **sub-image** histograms of the image-relevant **sub-images** and the summed-up frequency values are defined a as new frequency distribution over the corresponding luminance values L* as aggregate histogram.

(See Winkelman, col.10, line 4-col. 13, line 16, inclusive of col. 11, lines 15-23, col. 11, lines 25-38, and col. 12, line 45-col. 13, line 5, **bold** emphasis added, and equations being indicated by equation number of Winkelman)

As can be seen from the above text of Winkelman, Winkelman discusses sub-image analysis, sub-image histogram production and sub-image histogram parameter production. Winkelman does not teach or suggest dividing an image into sub-areas, computing a characteristic amount for each sub-area, computing a statistic amount for estimation of the tone color value level for the whole original image from the characteristic amounts of the sub-areas. By using such technique where an overall image statistic amount estimate for tone color value level is produced, the status of the entire or whole image can be determined and a correction can be made to the whole of the original image based on the estimate. The prior art of Winkelman (or of Kinjo and Katajamaki does not teach or suggest such.

Independent claims 14, 15, 17, 19 and 32-35 also emphasize the distinctions over Winkelman discussed above.

Kinjo and Katajamaki add nothing to Winkelman with respect to the above-discussed features.

The dependent claims depend from the above-discussed independent claims and are patentable over the prior art for the reasons discussed above. The dependent claims also recite additional features not taught or suggested by the prior art. For example, claim 18 calls for the determination of a weight coefficient for each sub-area. The Examiner points to Kinjo at col. 17, lines 42-46 and col. 17, line 60-col. 18, line 3 for this feature asserting that the "fifth mark" of Kinjo is equivalent to a weight coefficient. The marks of Kinjo are not weights but rather are grades or scores (see Kinjo, col. 17, line 37 and the fifth mark is particularly described as:

> A fifth mark is obtained in accordance with a pre-designated central position of the pupil and the distance between the eye. The further from the center of the pupil, the lower the fifth mark. The region having the highest mark is the region apparently having the characteristic the most similar to that of a pupil portion, that is, a red-eye region. The pupil portion has the highest fifth mark and the fifth mark decreases as the position moves apart from the pupil as shown in FIG. 19B which shows the marks at the dashed lines of FIG. 19A.

(See Kinjo, col. 18, lines 4-13)

The fifth mark, as can be seen from the above discussion in Kinjo, is not a weight coefficient. It is submitted that the dependent claims are independently patentable over the prior art.

New claim 36 emphasizes that all of the statistical amounts of the sub-areas of the image are used to produce a statistical value that corrects the entire image. As discussed above the prior art does not teach or suggest such and further, Winkelman does not use all of the sub-image histograms in determining a luminance histogram but rather uses sub-image histograms of sub-images that were classified as structure-rich. Kinjo and Katajamaki do not address this use of all of the statistical amounts. As a result, nothing in the prior art teaches or suggests such. It is submitted that this new claim, which is different and not narrower than prior filed claims, distinguishes over the prior art.

It is submitted that the claims are not taught, disclosed or suggested by the prior art. The claims are therefore in a condition suitable for allowance. An early Notice of Allowance is requested.

If any further fees, other than and except for the issue fee, are necessary with respect to this paper, the U.S.P.T.O. is requested to obtain the same from deposit account number 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

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By: J. Randall Beckers/
J. Randall Beckers
Registration No. 30,358

1201 New York Avenue, NW, 7th Floor
Washington, D.C. 20005
Telephone: (202) 434-1500
Facsimile: (202) 434-1501